

CLAIMS

What is claimed is:

1. A system comprising:
a plurality of generators coupled to supply power to a power network;
a voltage sampling circuit coupled to the plurality of generators to sample voltage levels of the power network, wherein a sampling rate of the voltage sampling circuit is greater than a frequency of the power supplied to the power network; and
a trigger circuit coupled with the voltage sampling circuit to, in response to a triggering event, cause samples corresponding to a predetermined time period preceding the triggering event and a predetermined time period after the triggering event to be captured.
2. The system of claim 1 wherein the power network comprises a utility grid.
3. The system of claim 1 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined ceiling threshold.
4. The system of claim 3 wherein the predetermined ceiling threshold comprises a voltage greater than 110% of rated voltage for the generators.
5. The system of claim 3 wherein the predetermined ceiling threshold comprises a voltage greater than 105% of rated voltage for the generators.

6. The system of claim 1 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined floor threshold.

7. The system of claim 6 wherein the predetermined floor threshold comprises a voltage less than 70% of rated voltage for the generators.

8. The system of claim 6 wherein the predetermined floor threshold comprises a voltage less than 30% of rated voltage for the generators.

9. The system of claim 1 wherein the predetermined period of time preceding the triggering event comprises approximately one cycle preceding the triggering event.

10. The system of claim 1 wherein the predetermined period of time preceding the triggering event comprises less than one cycle preceding the triggering event.

11. The system of claim 1 wherein the predetermined period of time after the triggering event comprises approximately one cycle after the triggering event.

12. The system of claim 1 wherein the predetermined period of time after the triggering event comprises less than one cycle after the triggering event.

13. The system of claim 1 wherein the samples are stored in a volatile memory of a first device and the captured samples are stored in a non-volatile memory of a second device.

14. The system of claim 1 further comprising a network interface coupled with the sampling circuit and to the triggering circuit to transmit the captured samples to a remote location.

15. The system of claim 1 wherein the samples are stored in a circular buffer and captured samples are retrieved from the circular buffer and stored in a non-volatile memory.

16. The system of claim 1 wherein the frequency is 60 Hertz.

17. The system of claim 16 wherein the sampling rate is 240 Hertz.

18. The system of claim 1 wherein the frequency is 50 Hertz.

19. The system of claim 18 wherein the sampling rate is 200 Hertz.

20. A method comprising:
monitoring a voltage output from a plurality of wind turbine generators coupled to a power network by sampling voltage levels of the power network, wherein a sampling

rate of the voltage sampling circuit is greater than a frequency of the power supplied to the power network; and

determining whether the sampled voltage levels are within a predetermined operating range;

designating a selected voltage sample as a triggering event if the selected voltage sample is not within the predetermined operating range; and

capturing voltage samples in response to the triggering event, wherein the captured voltage samples correspond to a predetermined time period preceding the triggering event and a predetermined time period after the triggering event.

21. The method of claim 20 further comprising automatically classifying a voltage disturbance corresponding to the captured voltage samples.

22. The method of claim 20 further comprising automatically ranking a voltage disturbance corresponding to the captured voltage samples.

23. The method of claim 20 wherein the power network comprises a utility grid.

24. The method of claim 20 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined ceiling threshold.

25. The method of claim 24 wherein the predetermined ceiling threshold comprises a voltage greater than 110% of rated voltage for the generators.
26. The method of claim 24 wherein the predetermined ceiling threshold comprises a voltage greater than 105% of rated voltage for the generators.
27. The method of claim 20 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined floor threshold.
28. The method of claim 27 wherein the predetermined floor threshold comprises a voltage less than 70% of rated voltage for the generators.
29. The method of claim 27 wherein the predetermined floor threshold comprises a voltage less than 30% of rated voltage for the generators.
30. The method of claim 20 wherein the predetermined period of time preceding the triggering event comprises approximately one cycle preceding the triggering event.
31. The method of claim 20 wherein the predetermined period of time preceding the triggering event comprises less than one cycle preceding the triggering event.

32. The method of claim 20 wherein the predetermined period of time after the triggering event comprises approximately one cycle after the triggering event.

33. The method of claim 20 wherein the predetermined period of time after the triggering event comprises less than one cycle after the triggering event.

34. A article comprising a computer-readable medium having stored thereon instructions that, when executed, cause one or more processors to:

monitor a voltage output from a plurality of wind turbine generators coupled to a power network by sampling voltage levels of the power network, wherein a sampling rate of the voltage sampling circuit is greater than a frequency of the power supplied to the power network; and

determine whether the sampled voltage levels are within a predetermined operating range;

designate a selected voltage sample as a triggering event if the selected voltage sample is not within the predetermined operating range; and

capture voltage samples in response to the triggering event, wherein the captured voltage samples correspond to a predetermined time period preceding the triggering event and a predetermined time period after the triggering event.

35. The article of claim 34 further comprising instructions that, when executed by the one or more processors, cause the one or more processors to automatically classify a voltage disturbance corresponding to the captured voltage samples.

36. The article of claim 34 further comprising instructions that, when executed by the one or more processors, cause the one or more processors to automatically rank a voltage disturbance corresponding to the captured voltage samples.

37. The article of claim 34 wherein the power network comprises a utility grid.

38. The article of claim 34 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined ceiling threshold.

39. The article of claim 38 wherein the predetermined ceiling threshold comprises a voltage greater than 110% of rated voltage for the generators.

40. The article of claim 38 wherein the predetermined ceiling threshold comprises a voltage greater than 105% of rated voltage for the generators.

41. The article of claim 34 wherein a triggering event comprises detection of a sampled voltage that exceeds a predetermined floor threshold.

42. The article of claim 41 wherein the predetermined floor threshold comprises a voltage less than 70% of rated voltage for the generators.

43. The article of claim 41 wherein the predetermined floor threshold comprises a voltage less than 30% of rated voltage for the generators.

44. The article of claim 34 wherein the predetermined period of time preceding the triggering event comprises approximately one cycle preceding the triggering event.

45. The article of claim 34 wherein the predetermined period of time preceding the triggering event comprises less than one cycle preceding the triggering event.

46. The article of claim 34 wherein the predetermined period of time after the triggering event comprises approximately one cycle after the triggering event.

47. The article of claim 34 wherein the predetermined period of time after the triggering event comprises less than one cycle after the triggering event.